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Description

This invention relates to a three/five layer injection moulded plastics preform for blow moulding to form a container and to a method of forming such a preform. In particular, this invention relates in general to new and useful improvements in plastic preforms from which plastic containers are blow molded, and most particularly to a plastic preform which is of a laminated construction.

Polyethylene terephthalate (PET) preforms and containers blow molded from such preforms are well known. However, PET per se does not have all of the necessary characteristics desired for containers. Accordingly, there has been developed a laminated preform which is primarily of a five layer construction including PET inner and outer layers, inner and outer intermediate barrier layers and a core which may be formed of PET or some other plastic. US-A-4,609,516 (Krishnakumar et al) and US-A-4,550,043 (Beck) are typical recent patents granted with respect to laminated preforms and containers blow molded therefrom.

EP-A-0161625 discloses a plastics preform having a five layer construction and a method of injection moulding such a preform. That document also discusses, as prior art thereto, a three layer preform construction in which an intermediate layer extends from the base forming portion to the body forming portion of the preform.

The present invention provides an injection molded plastics preform for blow molding to form a container, said preform comprising a neck finish portion, a shoulder forming portion, a body forming portion, and a base forming portion, at least said body forming portion and said base forming portion having inner and outer layers formed of a primary material and separated by a layer of a secondary material characterised in that the preform is in part formed in three layers and in part formed in five layers, at least said body forming portion being formed of only three layers with said secondary material forming a relatively thick core layer and in said base forming portion a central part of said secondary material being replaced by a core layer of material other than said secondary material, such that the five layer portion is substantially extensive with the base forming portion.

The present invention also provides a method of forming in an injection preform mold cavity a plastics preform, said method comprising the steps of first injecting into said mold cavity a metered quantity of a primary material; then injecting into the mold cavity a metered quantity of a secondary material to form a core layer within said primary material to form only a three layer construction; characterised by the plastics preform being in part formed in three layers and in part formed in five layers and said method including the step of finally injecting further material other than said secondary material thereby filling said mold cavity and forming a further core layer within said secondary material in only a last-formed preform container base forming portion to provide a five layer construction, with said only three layer construction extending along a substantial part of a container body forming portion of the preform above the preform container base forming portion of five layer construction.

This invention in particular relates to a plastic preform which is primarily of a three layer construction including inner and outer PET layers and an intermediate core layer. Such preforms are also known but have the inefficiency of the core layer material being more expensive than PET and further being unnecessary in the base portion of the resultant blow molded container due to the lack of biaxial orientation of the base portion and therefore a lack of reduction of thickness of the preform portion which forms the base portion of the resultant container.

This invention in particular relates to a third injection of plastic material into a preform injection mold cavity to complete the preform with this third injection of plastic material forming a core within the original core material and permitting the replacement of the more expensive core material in the base forming portion of the preform.

Further, while suitable apparatus has been devised for the sequential injection of different plastic materials into a preform injection mold cavity, it is to be understood that a nozzle through which the plastic material is injected into the preform injection mold cavity will have retained therein a small portion of the last injected material. The net result is that this retained plastic material within the nozzle becomes the first injected material in the formation of a next preform in the same preform injection mold cavity. It is undesirable to have the first injected plastic material into the preform injection mold cavity that which forms the core of a three layer preform. However, by making the last injected material the same or substantially the same as the first injected material, namely PET, this deficiency of the present molding apparatus can also be overcome.

Most particularly, in accordance with this invention, there is a first injection of a metered amount of a primary plastic material followed by a second injection of a metered amount of a secondary plastic material with the secondary plastic material serving to advance a first injected primary material into the preform injection mold cavity with the first injected material being wiped along the walls of the injection mold cavity and the secondary material forming a core between inner and outer layers of

the primary material. By controlling the volumes of the two injected materials, particularly the secondary material, and then filling the preform injection mold cavity by way of a third injection, the quantity of the secondary material may be greatly reduced. Further, by making the third injected material the same as the primary material, there remains in the injection nozzle to be first introduced into the preform injection mold cavity in the formation of the next following preform the same material as the primary material whereby the tip end of a neck finish portion of a preform will be of the desired material.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

Figure 1 is a half sectional view taken through a conventional preform injection mold which has injected molded therein a preform of a three/five layer construction in accordance with the invention.

Figure 2 is a diagram showing the injection sequence time of the three injections of plastic material into the preform mold cavity.

Figure 3 is a half sectional view taken through a container blow molded from the preform of Figure 1 with intermediate parts of the container body being broken away, the different layers not being shown.

Referring now to the drawings in detail, it will be seen that there is illustrated in Figure 1 a conventional preform injection mold identified by the numeral 10. The mold 10 is preferably of a multiple cavity type having a plurality of cavities 12 in which there is positioned a core 14. Each cavity 12 is provided with a base opening defining a seat 16 for an injection nozzle 18. The opening in the base of the mold 10 also includes a sprue opening 20 into the bottom of the cavity 12.

The mold 10 has associated therewith an openable neck ring 22 which is separable in sequence first from the mold 10 in conjunction with the core 14 to withdraw an injected preform, such as the preform 24, from the cavity 12 and then from the core 14 to release the molded preform 24, normally after the preform 24 has been stripped from the core 14.

The illustrated preform 24 includes a neck finish portion generally identified by the numeral 26 and including outer threads 28, a tamper band retaining shoulder 30 formed by a ring 32, and a support or capping flange 34.

Below the neck finish forming portion 26, the preform 24 includes a shoulder forming portion 36 which is of a tapered increasing thickness and which is connected to the neck finish forming portion 26 by a short ring portion 38.

Below the shoulder forming portion 36 is an elongated body forming portion 40 which is substantially cylindrical except for the slight taper of the cavity 12 and the core 14 and which is of a uniform thickness. The body forming portion 40 terminates in a base forming portion 42 which includes a cylindrical part 44 and a generally hemispherical bottom part 46. At this time it is pointed out that the cylindrical part 44 increases in thickness as compared to the body forming portion 40.

The preform 24 is formed generally in accordance with the patent to Pocock et al 4,525,401 granted June 25, 1985 wherein the base forming portion is of a greater wall thickness so as to permit a reduction in thickness of the intermediate or core forming layer.

As is best shown in Figure 2, the preform 24 is formed by the sequential injection of molten plastic material into the cavity 12. A preselected metered amount of a primary material A is first injected into the bottom portion of the cavity 12 through the nozzle 18. Next, a preselected metered amount of a secondary material B is injected into the cavity 12 with the material B forcing the material A into the cavity 12 with the material A adhering to the cavity walls as it passes into the cavity and the material B entering into the separated layers of the material A in the manner generally disclosed in the Krishnakumar et al and Beck patents.

Previously, only the amount of the material A was metered, with the material B being injected in a quantity to completely fill the cavity 12. However, in view of the fact that the material B will normally be more expensive than the material A, it is desired to restrict the use of the material B, particularly in the base forming portion 42. In accordance with this invention, this is accomplished by a third separate injection of molten plastic material, material C, into the mold cavity 12 to complete the filling of the mold cavity 12. The material C is located substantially entirely within the base forming portion 42 as is clearly shown in Figure 1.

At this time it is pointed out that the injection of the material C results in a material saving of the material B to the extent of the quantity of the material C.

Further, it is to be noted from Figure 1 that the last injected material will not only fill the screw opening 20, but also the final injection passage of the nozzle 18, which final injection passage is customary and not shown. It will be thus apparent that the quantity of the material C remaining within the final nozzle passage will be that material which is first injected into the cavity 12 in the formation of the next following preform 24. In the past, it has been found undesirable to inject a limited quantity of the material B at the beginning of the injection

molding cycle.

In the illustrated preform 26, it will be seen that the material B extends substantially to the top of the neck finish portion 26 although it may terminate lower in the neck finish portion 26, depending upon the amount of the material A which is initially injected into the cavity 12. The material B accordingly forms a core 48 separating the material A into an inner layer 50 and an outer layer 52. Thus, the preform 24 is primarily of a three layer construction.

At the present state of the plastic material art, virgin PE material is the preferred material for material A. On the other hand, depending upon the usage of the resultant container, the material B may be selected from a variety of materials including colored PET, recycled PET, MXD-6 nylon; copolyesters, polypropylene (PP), PP/PET blend, polyacrylonitrile, polycarbonate, and the like.

Prior to this invention, the material A would constitute 40-60% of the volume of the preform 24 while the material B would constitute the remainder of the volume of the preform 24 thus varying between 40 and 60% of the total volume. In accordance with this invention, there can be a material saving of the material B by filling the cavity 12 with the material C. The percent volume of the material B can be reduced to 30-40 while the percent volume of the material C will be between 10 and 20.

Referring once again to Figure 1, it will be seen that in the base forming portion 42, the material C forms a core layer 54 within the layer 48, dividing the layer 48 into an inner intermediate layer 56 and an outer intermediate layer 58 while the inner layer 50 and the outer layer 52 remains substantially the same. Thus the base forming portion 42 is of a five layer construction.

Further, as is clearly shown at the bottom of the preform 24, the last injected plastic material is the plastic material C which is in the form of a sprue 60 that extends through the outer intermediate layer 58 and the outer layer 52. As stated above, the material C is preferably the same as the material A, namely PET.

Referring now to Figure 3, it will be seen that the preform 24 is blow molded to form, in a conventional manner, a container 62. The container 62 will have a neck finish portion 26 identical to that of the preform 24. It will also include an unstretched and thus unoriented ring portion corresponding to the ring portion 38.

On the other hand, the shoulder forming portion 36 will be gradually stretched both axially and radially to be of a decreasing thickness and increasing biaxial orientation to define a shoulder 64.

The body forming portion 40 of the preform 24 will be both axially and radially materially stretched to form a highly biaxially oriented container body 66. Finally, the base forming portion 42 of the preform 24 will become an outer generally cylindrical base portion 68, a supporting curved annulus 70 and a bottom wall 72. It will be seen that the base of the container 62 gradually increases in thickness towards the center of the base with the center of the base being substantially unstretched and of the same thickness as the extreme bottom of the preform 24.

From the foregoing, it will be seen that the conventional three layer container may be modified so that the base of such a container is essentially of a five layer construction while the body portion 66 and the upper part of the container will be of a three layer construction. On the other hand, the great reduction of the secondary material in the container base in no way detracts from the appearance, strength or possible barrier characteristics of the resultant container. Thus, in accordance with this invention the container 62 may be made at a lesser material cost than a like container which is solely of a three layer construction.

Claims

1. An injection molded plastics preform (24) for blow molding to form a container (62), said preform (24) comprising a neck finish portion (26), a shoulder forming portion (36), a body forming portion (40), and a base forming portion (42), at least said body forming portion (40) and said base forming portion (42) having inner and outer layers (50,52) formed of a primary material (A) and separated by a layer (48) of a secondary material (B), characterised in that the preform (24) is in part formed in three layers and in part formed in five layers, at least said body forming portion (40) being formed of only three layers with said secondary material forming a relatively thick core layer (48) and in said base forming portion (42) a central part of said secondary material (B) being replaced by a core layer (54) of material (C) other than said secondary material (B), such that the five layer portion is substantially extensive with the base forming portion (42).

2. A preform according to claim 1 wherein said secondary material (B) in said base forming portion is separated into relatively thin inner and outer intermediate layers (56,58).

3. A preform according to claim 1 or claim 2 wherein said material (C) other than said secondary material (B) is the same as said primary material (A) whereby said preform (24) is of a two material construction.

4. A preform according to any one of claims 1 to 3 wherein said primary material (A) and said secondary material (B) are of preselected metered quantities and said material (C) other than said second material (B) is of a quantity to complete filling of a preform injection mold cavity (12).

5. A preform according to any foregoing claim wherein said secondary material (B) extends as a core (48) through said shoulder forming portion (36).

6. A preform according to any foregoing claim wherein said base forming portion (42) includes a part (44) forming an extension of said body forming portion (40) and of an increased wall thickness as compared to an adjacent part of said body forming portion (40).

7. A preform according to claim 1 wherein the primary and secondary materials (A,B) are of substantially the same plastics material.

8. A preform according to claim 7 wherein the primary and secondary materials (A,B) are substantially polyethylene terephthalate (PET) plastics materials.

9. A preform according to claim 8 wherein the primary material (A) is substantially virgin PET and the second material (B) is substantially recycled PET or coloured PET.

10. A preform according to claim 1 wherein the secondary material (B is a barrier material.

11. A preform according to claim 1 wherein the secondary material (B) is less expensive than the primary material (A).

12. A preform according to claim 1 wherein the primary material (A) is virgin PET and the secondary material (B) is selected from coloured PET, recycled PET, MXD-6 nylon, copolyester, copolypropylene (PP), PP/PET blend polyacrylonit rile, or polycarbonate.

13. A method of forming in an injection preform mold cavity (12) a plastics preform (24), said method comprising the steps of first injecting into said mold cavity (12) a metered quantity of a primary material (A); then injecting into the mold cavity (12) a metered quantity of a secondary material (B) to form a core layer (48) within said primary material (A) to form only a three layer construction; characterised by the plastics preform (24) being in part formed in three layers and in part formed in five layers and said method including the step of finally injecting further material (C) other than said secondary material (B) thereby filling said mold cavity (12) and forming a further core layer (54) within said secondary material (B) in only a last-formed preform container base forming portion (42) to provide a five layer construction, with said only three layer construction extending along a substantial part of a container body forming portion (40) of the preform (24) above the preform container base forming portion (42) of five layer construction.

14. A method according to claim 13 wherein said secondary material (B) in said base forming portion (42) is separated into relatively thin inner and outer intermediate layers (56,58).

15. A method according to claim 13 or claim 14 wherein said material (C) other than said secondary material (B) is the same as said primary material (A) whereby said preform (24) is of a two material construction.

16. A method according to any one of claims 13 to 15 wherein said primary material (A) and said secondary material (B) are of preselected metered quantities and said material (C) other than said secondary material (B) is of a quantity to complete filling of a preform injection mold cavity.

17. A method according to any one of claims 13 to 16 wherein said secondary material (B) extends as a core layer (48) through a container shoulder forming portion (36) of the preform.

18. A method according to any one of claims 13 to 17 wherein said base forming portion (42) includes a part (44) forming an extension of said body-forming portion (40) and of an increased wall thickness as compared to an adjacent part of said body forming portion (40).

19. A method according to claim 13 or 14 wherein the primary and secondary materials (A,B) are of substantially the same plastics material.

20. A method according to claim 19 wherein the primary and secondary materials (A,B) are substantially polyethylene terephthalate (PET) plastic materials.

21. A method according to claim 20 wherein the primary material (A) is substantially virgin PET and the secondary material (B) is substantially recycled or coloured PET.

22. A method according to claim 13 or claim 14 wherein the secondary material (B) is a barrier material.

23. A method according to calim 13 or claim 14 wherein the secondary material (B) is less expensive than the primary material (A).

24. A method according to claim 13 or claim 14 wherein the primary material (A) is virgin PET and the secondary material (B) is selected from coloured PET, recycled PET, MXD-6 nylon, copolyesters, polypropylene (PP), PP/PET blend, polyacrylonitrile, or polycarbonate.

Patentansprüche

1. Spritzgegossener Kunststoff-Vorformling (24) zum Blasformen eines Behälters (62), wobei der Vorformling (24) einen als Hals ausgeformten Abschnitt (26), einen eine Schulter bildenden Abschnitt (36), einen einen Rumpf bildenden Abschnitt (40) sowie einen einen Fuß bildenden Abschnitt (42) aufweist, mindestens der rumpfbildende Abschnitt (40) und der fußbildende Abschnitt (42) eine Innen- und eine Außenschicht (50, 52) aus einem primären Material (A) aufweisen, die von einer Schicht (48) eines sekundären Materials (B) getrennt werden, **dadurch gekennzeichnet,** daß der Vorformling (24) teilweise drei- und teilweise fünfschichtig ausgebildet ist, daß mindestens der rumpfbildende Abschnitt (40) nur dreischichtig ausgebildet ist, wobei das sekundäre Material eine verhältnismäßig dicke Kernschicht (48) bildet, und daß im fußbildenden Abschnitt (42) ein mittlerer Teil des sekundären Materials (B) durch eine Kernschicht (54) aus einem sich vom sekundären Material (B) unterscheidenden Materials (C) ersetzt ist derart, daß der fünfschichtige Teil sich im wesentlich entsprechend dem fußbildenden Abschnitt (42) erstreckt.

2. Vorformling nach Anspruch 1, bei dem das sekundäre Material (B) im fußbildenden Abschnitt zu einer inneren und einer äußeren Schicht (56, 58) unterteilt ist, die verhältnismäßig dünn sind.

3. Vorformling nach Anspruch 1 oder 2, bei dem das sich vom Material (B) unterscheidende Material (C) dem primären Material (A) entspricht, so daß der Vorformling (24) aus zwei Masterialien aufgebaut ist.

4. Vorformling nach einem der Ansprüche 1 bis 3, bei dem das primäre Material (A) und das sekundäre Material (B) in vorgewählt dosierten Mengen und das sich vom zweiten Material (B) unterscheidende Material (C) in einer solchen Menge vorliegt, daß der Innenraum (12) der Spritzform für den Vorformling aufgefüllt wird.

5. Vorformling nach einem der vorgehenden Ansprüche, bei dem das sekundäre Material (B) als ein Kern (48) durch den schulterbildenden Abschnitt (36) hindurch verläuft.

6. Vorformling nach einem der vorgehenden Ansprüche, bei dem der fußbildende Abschnitt (42) einen den rumpfbildenden Abschnitt (40) fortsetzenden Teil (44) mit einer größeren Wanddicke als ein angrenzender Teil des fußbildenden Abschnitts (40) aufweist.

7. Vorformling nach Anspruch 1, bei dem das primäre und das sekundäre Material (A, B) im wesentlichen der gleiche Kunststoff sind.

8. Vorformling nach Anspruch 7, bei dem das primäre und das sekundäre Material (A, B) im wesentlichen ein Polyethylenterephthalat-Kunststoff (PET) sind.

9. Vorformling nach Anspruch 8, bei dem das primäre Material (A) im wesentlichen Frisch-PET und das zweite Material (B) im wesentlichen rezykliertes oder farbiges PET sind.

10. Vorformling nach Anspruch 1, bei dem das sekundäre Material (B) ein Sperrmaterial ist.

11. Vorformling nach Anspruch 1, bei dem das sekundäre Material (B) kostengünstiger als das primäre Material (A) ist.

12. Vorformling nach Anspruch 1, bei dem das primäre Material (A) Frisch-PET und das sekundäre Material (B) aus der aus farbigem PET, rezykliertem PET, MXD-6-Nylon, Copolyestern, Copolypropylen (PP), PP/PET-Mischungen, Polyacrylnitril oder Polycarbonat bestehenden Gruppe gewählt ist.

13. Verfahren zur Herstellung eines Kunststoff-Vorformlings (24) in einer Spritzform, indem man in deren Formhohlraum (12) zunächst eine dosierte Menge eines primären Materials (A) einspritzt, dann in den Formhohlraum (12) eine dosierte Menge eines sekundären Materials (B) einspritzt, um innerhalb des primären Materials eine Kernschicht (48) und so einen nur dreischichtigen Aufbau auszubilden, **dadurch gekennzeichnet,** daß der Kunststoff-Vorformling (24) zum Teil drei- und zum Teil fünfschichtig

ausgebildet wird und man abschließend ein weiteres, sich vom sekundären Material (B) unterscheidendes Material (C) einspritzt, so den Formhohlraum (12) auffüllt und dabei innerhalb des sekundären Materials (B) nur im zuletzt ausgebildeten fußbildenden Abschnitt (42) des Vorformlings eine weitere Kernschicht (54) zu einem fünfschichtigen Aufbau ausbildet, wobei der nur dreischichtige Aufbau sich oberhalb des fünfschichtig aufgebauten, den Behälterfuß bildenden Abschnitts (42) des Vorformlings über einen wesentlichen Teil des den Behälterrumpf bildenden Abschnitts (40) des Vorformlings (24) erstreckt.

14. Verfahren nach Anspruch 13, bei dem das sekundäre Material (B) im fußbildenden Abschnitt (42) zu einer inneren und eine äußeren Schicht (56, 58) getrennt wird, die verhältnismäßig dünn sind.

15. Verfahren nach Anspruch 13 oder 14, bei dem das sich vom sekundären Material (B) unterscheidende Material (C) dem primären Material (A) entspricht, so daß der Vorformling (24) aus zwei Materialien aufgebaut wird.

16. Verfahren nach einem der Ansprüche 13 bis 15, bei dem das primäre Material (A) und das sekundäre Material (B) in vorgewählt dosierten Mengen vorliegen und das sich vom sekundären Material (B) unterscheidende Material (C) in einer solchen Menge vorliegt, daß eine Spritzform für den Vorformling aufgefüllt wird.

17. Verfahren nach einem der Ansprüche 13 bis 16, bei dem das sekundäre Material (B) sich als Kernschicht (48) über einen die Behälterschulter bildenden Abschnitt (36) des Vorformlings erstreckt.

18. Verfahren nach einem der Ansprüche 13 bis 17, bei dem der fußbildende Abschnitt (42) einen den rumpfbildenden Abschnitt (40) fortsetzenden Teil (44) aufweist, in dem die Wanddicke größer ist als in einem angrenzenden Teil des rumpfbildenden Abschnitts (40).

19. Verfahren nach Anspruch 13 oder 14, bei dem das primäre und das sekundäre Material (A, B) im wesentlichen der gleiche Kunststoff sind.

20. Verfahren nach Anspruch 19, bei dem das primäre und das sekundäre Material (A, B) im wesentlichen Polyethylenterephthalat-Kunststoff (PET) sind.

21. Verfahren nach Anspruch 20, bei dem das primäre Material (A) im wesentlichen frisches PET und das sekundäre Material (B) im wesentlichen rezykliertes oder farbiges PET sind.

22. Verfahren nach Anspruch 13 oder 14, bei dem das sekundäre Material (B) ein Sperrmaterial ist.

23. Verfahren nach Anspruch 13 oder 14, bei dem das sekundäre Material (B) kostengünstiger als das primäre Material (A) ist.

24. Verfahren nach Anspruch 13 oder 14, bei dem das primäre Material (A) Frisch-PET und das sekundäre Material (B) aus der aus farbigem PET, rezyliertem PET, MXD-6-Nylon, Copolyestern, Copolypropylen (PP), PP/PET-Mischungen, Polyacrylnitril oder Polycarbonat bestehenden Gruppe gewählt ist.

Revendications

1. Une pré-forme plastique moulée par injection (24) afin de former par moulage par soufflage un récipient (62), ladite pré-forme (24) comprenant une portion d'extrémité de goulot (26), une portion formant un épaulement (36), une portion formant le corps (40), et une portion formant la base (42), ladite portion formant le corps (40) et ladite portion formant la base (42) au moins présentant des couches intérieure et extérieure (50, 52) formées d'une première matière (A) et séparées par une couche (48) d'une seconde matière (B), caractérisée en ce que la pré-forme (24) est en partie formée de trois couches et en partie formée de cinq couches, au moins ladite portion formant le corps (40) étant formée de trois couches seulement avec ladite seconde matière formant une couche de noyau relativement épaisse (48) et une partie centrale de ladite seconde matière (B) étant remplacée par une couche de noyau (54) de matière (C) autre que ladite seconde matière (B) dans ladite portion formant la base (42), de telle sorte que la portion de cinq couches présente une extension substantielle avec la portion formant la base (42).

2. Une pré-forme selon la Revendication 1, dans laquelle ladite seconde matière (B) dans ladite portion formant la base est séparée en couches intermédiaires intérieure et extérieure relativement fines (56, 58).

3. Une pré-forme selon la Revendication 1 ou 2, dans laquelle ladite matière (C) autre que ladite seconde matière (B) est la même que ladite

première matière (A) et dans laquelle ladite pré-forme (24) est réalisée selon une configuration à deux matières.

4. Une pré-forme selon l'une quelconque des Revendications 1 à 3, dans laquelle ladite première matière (A) et ladite seconde matière (B) sont présentes en quantités mesurées présélectionnées, et ladite matière (C) autre que ladite seconde matière (B) est présente en quantité permettant de réaliser le remplissage d'une empreinte de moule d'une pré-forme par injection (12).

5. Une pré-forme selon l'une quelconque des Revendications précédentes, dans laquelle ladite seconde matière (B) s'étend sous forme de noyau (48) à travers ladite portion formant un épaulement (36).

6. Une pré-forme selon l'une quelconque des Revendications précédentes, dans laquelle ladite portion formant la base (42) comprend une partie (44) formant une extension de ladite portion formant le corps (40) et présente une épaisseur de paroi plus importante comparée à une partie adjacente de ladite portion formant le corps (40).

7. Une pré-forme selon la Revendication 1, dans laquelle les première et seconde matières (A, B) sont substantiellement issues de la même matière plastique.

8. Une pré-forme selon la Revendication 7, dans laquelle les première et seconde matières (A, B) sont substantiellement des matières plastique de téréphtalate de polyéthylène (PET).

9. Une pré-forme selon la Revendication 8, dans laquelle la première matière (A) est substantiellement du PET vierge et la seconde matière (B) est substantiellement du PET recyclé ou du PET coloré.

10. Une pré-forme selon la Revendication 1, dans laquelle la seconde matière (B) est un matériau barrière.

11. Une pré-forme selon la Revendication 1, dans laquelle la seconde matière (B) est moins coûteuse que la première matière (A).

12. Une pré-forme selon la Revendication 1, dans laquelle la première matière (A) est du PET vierge et la seconde matière (B) est sélectionnée parmi du PET coloré, du PET recyclé, du nylon MXD-6, du copolyester, du copolypropylène (PP), du polyacrylonitrile de mélange PP/PET, ou du polycarbonate.

13. Une méthode pour former une pré-forme plastique (24) dans une empreinte de moule de pré-forme par injection (12), ladite méthode comprenant les étapes consistant d'abord à injecter dans ladite empreinte de moule (12) une quantité mesurée d'une première matière (A) ; ensuite à injecter dans l'empreinte de moule (12) une quantité mesurée d'une seconde matière (B) pour former une couche de noyau (48) à l'intérieur de ladite première matière (A) pour former une configuration à trois couches seulement ; caractérisée en ce que la pré-forme plastique (24) est en partie formée en trois couches et en partie formée en cinq couches, ladite méthode comprenant l'étape consistant pour finir à injecter une matière supplémentaire (C) autre que ladite seconde matière (B) en remplissant ainsi ladite empreinte de moule (12) et formant une couche de noyau supplémentaire (54) à l'intérieur de ladite seconde matière (B) seulement dans une portion formant la base de récipient de la dernière pré-forme formée (42) pour fournir une configuration à cinq couches, ladite configuration à trois couches seulement s'étendant le long d'une partie substantielle d'une portion formant le corps du récipient (40) de la préforme (24) au-dessus de la portion formant la base du récipient de la pré-forme (42) de configuration à cinq couches.

14. Une méthode selon la Revendication 13, dans laquelle ladite seconde matière (B) dans ladite portion formant la base (42) est séparée en couches intermédiaires intérieure et extérieure relativement fines (56, 58).

15. Une méthode selon la Revendication 13 ou 14, dans laquelle ladite matière (C) autre que ladite seconde matière (B) est la même que ladite première matière (A), et dans laquelle ladite pré-forme (24) est réalisée selon une configuration à deux matières.

16. Une méthode selon l'une quelconque des Revendications 13 à 15, dans laquelle ladite première matière (A) et ladite seconde matière (B) sont présentes en quantités mesurées présélectionnées, et ladite matière (C) autre que ladite seconde matière (B) est présente en quantité permettant de réaliser le remplissage d'une empreinte de moule d'une pré-forme par injection.

17. Une méthode selon l'une quelconque des Revendications 13 à 16, dans laquelle ladite seconde matière (B) s'étend sous forme d'une couche de noyau (48) à travers une portion formant l'épaulement du récipient (36) de la pré-forme.

18. Une méthode selon l'une quelconque des Revendications 13 à 17, dans laquelle ladite portion formant la base (42) comprend une partie (44) formant une extension de ladite portion formant le corps (40) et présente une épaisseur de paroi plus importante comparée à une partie adjacente de ladite portion formant le corps (40).

19. Une méthode selon la Revendication 13 ou 14, dans laquelle les première et seconde matières (A, B) sont substantiellement issues de la même matière plastique.

20. Une méthode selon la Revendication 19, dans laquelle les première et seconde matières (A, B) sont substantiellement des matières plastique de téréphtalate de polyéthylène (PET).

21. Une méthode selon la Revendication 20, dans laquelle la première matière (A) est substantiellement du PET vierge et la seconde matière (B) est substantiellement du PET recyclé ou du PET coloré.

22. Une méthode selon la Revendication 13 ou 14, dans laquelle la seconde matière (B) est un matériau barrière.

23. Une méthode selon la Revendication 13 ou 14, dans laquelle la seconde matière (B) est moins coûteuse que la première matière (A).

24. Une méthode selon la Revendication 13 ou 14, dans laquelle la première matière (A) est du PET vierge et la seconde matière (B) est sélectionnée parmi du PET coloré, du PET recyclé, du nylon MXD-6, du copolyester, du copolypropylène (PP), du polyacrylonitrile de mélange PP/PET, ou du polycarbonate.

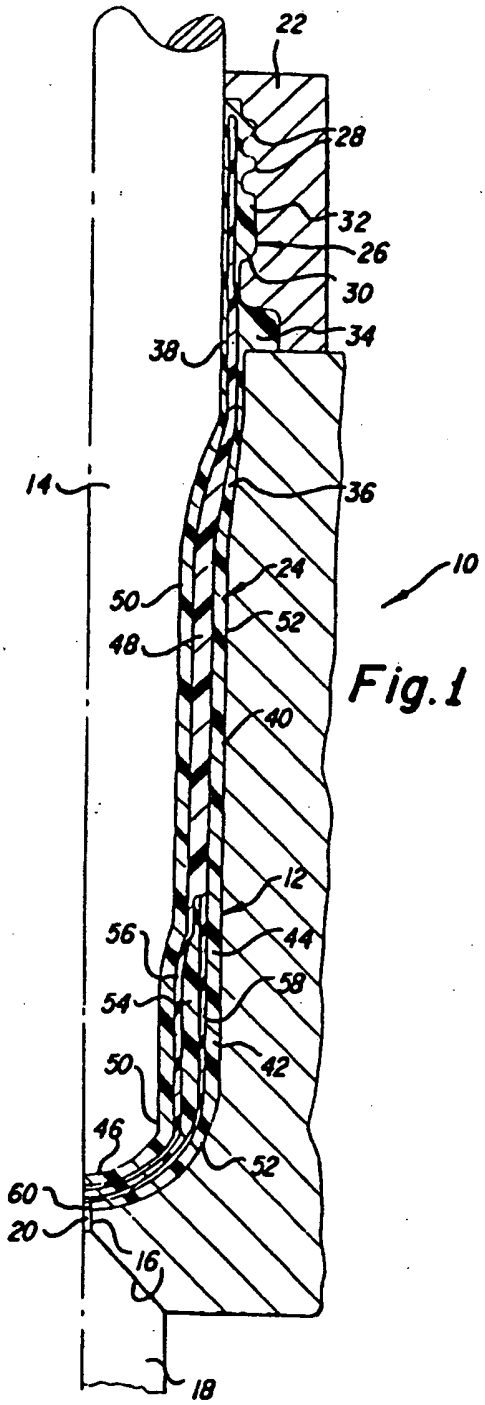

Fig. 1

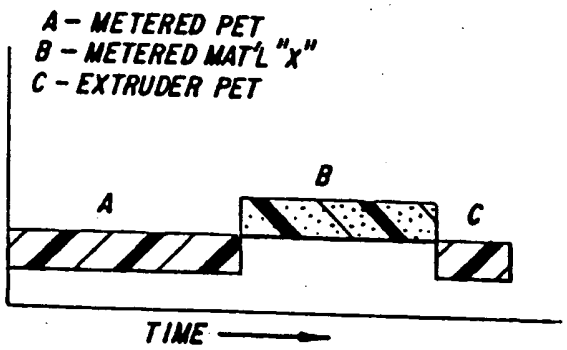

Fig. 2

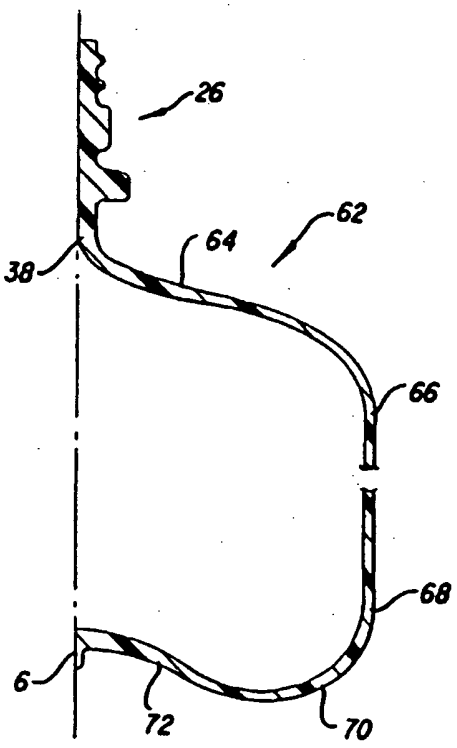

Fig. 3